24. (Added) The system of claim 13 wherein the shape index does not correspond to a code point.

25. (Added) The system of claim 13 wherein the recognition information received from the primary recognizer does not correspond to a code point, and wherein the recognition result comprises a single code point.

C3

26. (Added) The method of claim 18 wherein the shape index does not correspond to a code point.

27. (Added) The method of claim 26 wherein the recognition result comprises a single code point.

REMARKS

The Office action dated November 23, 2001 has been carefully considered. In the Office action, claims 1, 2, 7, 8 and 12 were rejected under 35 U.S.C. 102(a) as being anticipated by Pintsov, U.S. Patent No. 5,881,172 (hereinafter Pintsov). Claims 13-15 and 17 were rejected under 35 U.S.C. 103(a) as being unpatentable over Pintsov in view of Crane et al., U.S. Patent No. 4,718,102 (hereinafter Crane). Claims 3-6, 9-11, 16 and 18 were rejected under 35 U.S.C. 103(a) as being unpatentable over Pintsov in view of Crane, and further in view of Guo et al. "Classification trees with neural network feature extraction," Proceedings IEEE Computer Society Conference on Computer Vision and

Pattern Recognition, June 1992 (hereinafter Guo). By the present amendment, claims 1, 7, 13 and 18 have been amended, and the rejections traversed in view of the following remarks. Reconsideration is respectfully requested.

Before addressing the prior art rejections, applicants will comment on page 2, numbered paragraph 3 of the Office action, wherein is appears evident that the rejections in the Office action are based on at least one fundamental misconception about the present invention. Applicants submit that the Office action appears to have concluded that the entire goal and/or purpose of the present invention is to resolve confusion sets via secondary recognizers. While this is one aspect, another important aspect that the Office action has overlooked is that the present invention provides a system and method such that the primary recognizer does not have to be concerned with or in any way programmed, arranged and/or modified to detect such possible confusion sets.

For example, the Office action contends, in numbered paragraph 3 thereof, that "the secondary recognizers are used when the primary recognizer is confronted with a character that is typically easily confused with another or several other characters." However, to the extent this contention might be interpreted as suggesting that the *only* time secondary recognizers are ever used is when a confusion set exists, this contention is incorrect. In fact, when the primary recognizer outputs a shape index that is not a valid recognition result, such as an output that is not a code point but rather is only an index to a secondary recognizer, a secondary recognizer is used, even if only a very minimal one. See e.g., specification, page 22, lines 6-9.

More importantly, this contention in the Office action appears to imply (incorrectly) that the primary recognizer plays a role in directly detecting a possible confusion set when confronted with easily confused character or characters. In fact, the primary recognizer of the present invention does not deal with detecting confusion sets at all. Unlike the prior art of record, (including Pintsov, discussed below), the primary recognizer only outputs its own initial determination, without considering possible confusion, and thereafter does not participate in the recognition process. Instead, at the time of recognition of a chirograph, a selection mechanism external to and independent of the primary recognizer (see e.g., the CART tree lookup 84 and the cart tree selector 86 components of FIG. 10 of the present application) detects and resolves any confusion sets by (possibly) selecting a secondary recognizer.

Thus, a secondary recognizer is used 1) when, unknown to a primary recognizer that outputs a valid recognition result, a secondary recognizer is selected that can alter the primary recognizer's result, or 2) whenever a primary recognizer outputs a recognition result that is a shape index of the type that is not a valid recognition result by itself. In neither situation does the primary recognizer act differently for input that may be easily confused versus input that is more definite, let alone "when confronted by a character that is typically easily confused with another or several other characters" as implied in the Office action, and as essentially found in the prior art.

Continuing with its misunderstanding of the present invention, the Office action alleges that the specification does not support the ability of the secondary recognizers to output any character. This allegation is incorrect and illogical; a secondary recognizer can

provide any output that it is trained to output, (although this does not mean that every secondary recognizer has been trained to output every possible character), regardless of anything that the primary recognizer has previously done. Indeed, in an implementation in which the primary recognizer outputs a shape index that is *not* a valid output result, the secondary recognizer has to be able to output something different from the primary recognizer's output, otherwise doing so would result in an invalid output.

By way of example, probably the simplest example of a shape index that is not a code point is a general numeric value, (as one skilled in the art would recognize from the well understood term "index"). See specification, page 16, lines 24-25; page 22, lines 6-7. Upon reading the specification, even one not necessarily skilled in the art realizes that once the secondary recognizer is selected by such an index that is not itself a valid result, the secondary recognizer cannot be bound in its output by the primary recognizer's output, and instead outputs what it is trained to output, which can be essentially any valid output. In fact, not only is this supported in the specification, but is the only sensible interpretation of how such a non-code point, index-selected secondary recognizer operates, e.g., to output a code point from a shape index that is not a code point. See specification, page 23, lines 12-18.

By way of example, suppose that when given a handwritten character, a recognition system according to the present invention is configured to output only ASCII code points of the set ranging from capital "A" to capital "Z"). If the primary recognizer is one that outputs a shape index that is not a code point, such as an index ranging from zero to fourteen, (note that the number of possible shape indexes need not match the

number of possible outputs by the secondary recognizer, which can be more than, less than or equal to the number of shape indexes), the secondary recognizer indexed by the primary recognizer's output value (e.g., twelve decimal) is selected. When fed the handwritten character, the secondary recognizer indexed by twelve will output whatever it has been trained to output, any one ASCII code point ranging from capital "A" to capital "Z," (although the secondary recognizer indexed by twelve need not necessarily be able to output every one of the possible results from A to Z). Clearly it is nonsensical to consider the primary recognizer as binding or even influencing the secondary recognizer to output a twelve, since a twelve is not in this range of ASCII character values (capital "A" is 65 decimal, capital "Z" is 90 decimal).

Simply put, via a shape index, the primary recognizer's result may be used only to select a secondary recognizer, and the primary recognizer's result may not itself be valid. Since thereafter the primary recognizer does not participate in or otherwise control any aspect of what the secondary recognizer does, or what the secondary recognizer outputs, the secondary recognizers clearly need to be able to provide any valid outputs based on its own independent analysis of the input.

Thus, the present invention is generally directed towards a primary and secondary recognizer, wherein essentially, the recognition decision of the primary recognizer (a shape index, which may or may not be a code point) may be or is used as the index for selecting the secondary recognizer, if desired. In the situation wherein the primary recognizer has output a valid recognition result, and thus a secondary recognizer may or may not be selected, the decision as to whether to select a secondary recognizer, and if so which one

to select, is done external to the primary recognizer, which after providing its recognition decision, does not make any further decision and/or otherwise participate in the rest of the recognition process. Similarly, in the situation wherein the primary recognizer has output a shape index that is not output a valid recognition result, and thus a secondary recognizer is needed, the decision as to which secondary recognizer to select is made external to the primary recognizer. In either situation, after providing its shape index, the primary recognizer does not make any further decisions.

The advantages of not involving the primary recognizer in detecting possible confusion and/or otherwise making such decisions are numerous and significant. For example, with the present invention, it is readily apparent that the primary recognizer is not dependent on any particular set of the secondary recognizers, and need not be adapted in any way for secondary recognition. Indeed, with the present invention, recognition accuracy can be increased using an existing, already developed primary recognizer, without any modification to it, simply by adding secondary recognizers behind it, such as when those secondary recognizers are determined to improve recognition (see e.g., specification, page 20, line 20 to page 21, line 16 and page 21 line 23 to page 22, line 2). Further, as better questions become available and/or more data is used to develop secondary recognizers, (see e.g., specification, page 17, line 14 to page 18, line 3; page 19 lines 16-18, and page 22 lines 2-5), recognition accuracy may again improve, including to a point where a secondary recognizer now improves accuracy to a point where it is included in the system instead of being rejected as not providing an appropriate level of improvement (see e.g., specification, page 20, line 25 to page 21, line 3).

Turning to the rejection on the art, the Office action has rejected claims 1, 2, 7, 8 and 12 as being anticipated by Pintsov contending that "Pintsov's system is exactly the type of system that the applicant is trying to implement." However, this contention is incorrect. At the very least, Pintsov's universal classifier is significantly different than applicants' primary recognizer because Pintsov's universal classifier needs to be pre-programmed to detect confusion sets, i.e., Pintsov's universal classifier has to be aware of when to implement the specialist classifiers and when not to implement them. Pintsov, column 4, lines 4-10 and FIG. 5. In fact, Pintsov's universal classifier calls a specialist classifier for suspicious characters, (Pintsov, column 3, lines 44-45 and FIG. 5), and thus the universal classifier makes the decision as to when to resolve confusion. As a result, Pintsov's model is different than applicants' claimed invention, in which the primary recognizer only outputs a shape index (which may or may not be a code point), and never makes any decision as to whether possible confusion should be further resolved. As discussed above, the present invention, in which post-primary recognition decisions are made as to resolving any confusion, thus has numerous and significant advantages over Pintsov's model and similar prior art models in which the responsibility for the confusion decisions lies with the initial (or only) recognizer. For example, Pintsov's universal classifier would have to be re-programmed to add a new specialist classifier, whereas the primary recognizer of the present invention would not.

In sum, Pintsov, like the other prior art of record, fails to teach or even suggest using the output of a primary recognizer as a basis for selecting a secondary recognizer, and/or thereafter having the primary recognizer make no further decisions as to detecting

or resolving confusion. Each of the independent claims essentially recite such subject matter, which provides numerous and non-trivial advantages over the prior art of record.

By law, an anticipation rejection under 35 U.S.C. § 102 requires that a single prior art reference disclose each element of the claim under consideration, and each element must be "arranged as in the claim." Pintsov, which is deficient for at least the significant reasons set forth above, clearly fails to meet these requirements. Reconsideration and withdrawal of the §102 rejections of the claims based on Pintsov is respectfully requested.

Considering next the §103(a) rejections as a whole, by law, to establish *prima facie* obviousness of a claimed invention, all the claim limitations must be taught or suggested by the prior art. *In re Royka*, 490 F.2d 981, 180 USPQ 580 (CCPA 1974). Further, "all words in a claim must be considered in judging the patentability of that claim against the prior art." *In re Wilson*, 424 F.2d 1382, 1385, 165 USPQ 494, 496 (CCPA 1970).

Applicants submit that none of the prior art of record discloses, suggests or provides any motivation for a primary recognizer that outputs a shape index that may be used to select a secondary recognizer, and/or a primary recognizer that makes no decision as to whether a secondary recognizer is to be invoked to resolve a confusion set. The deficiencies of Pintsov with respect to the claims have been discussed above, and will not be repeated herein for purposes of brevity. Crane, discussed in applicants' previous response, identifies the confusion set first, (in "forward processing"), and binds any further recognition to the narrowing of this confusion set. Crane, column 6, lines 27-31, and column 4, lines 58-61. Thus, like Pintsov, Crane cannot be reasonably interpreted as

providing a shape index that, without further decision by the primary recognizer, is used to select a secondary recognizer. Thus, even if permissible to combine these references, applicants' claimed invention is not reached by such a combination.

Guo likewise fails to teach, suggest or provide any motivation for a secondary handwriting recognizer, let alone one selected based on a shape index output by a primary recognizer, and/or a making a secondary recognition decision without a decision by a primary recognizer. Thus, it is apparent that the Office action had to rely on applicants' teachings to combine these references and make up for the significant deficiencies in their teachings. Indeed, rather that locating some specific motivation to combine the references, the ultimate motivation alleged in the Office action for combining Guo with the prior art references ("to provide a more accurate result") is nothing but a mere conclusory goal of handwriting recognition in general, without citing any support as to how this might be accomplished or what might result from such a combination. In fact the only motivation for locating and combining these references is applicants' own teachings, but it is well settled that the use of applicants' teachings in order to reconstruct applicants' claimed invention is impermissible by law.

For at least the foregoing reasons, applicants submit that it is not permissible to combine Pintsov, Crane and/or Guo, but even if somehow permissible to combine any or all of these references, the claims still recite patentable subject matter over the combined teachings of these references. Applicants respectfully request withdrawal of the §103(a) rejections of the claims based on Pintsov, Crane and/or Guo.

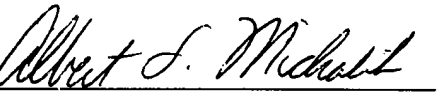
CONCLUSION

In view of the foregoing remarks, it is respectfully submitted that claims 1-27 of the present application are patentable over the prior art of record, and that the application and claims are otherwise in good and proper form for allowance. A favorable action on the part of the Examiner is earnestly solicited.

If in the opinion of the Examiner a telephone conference would expedite the prosecution of the subject application, the Examiner is invited to call the undersigned attorney at (425) 836-3030.

Signed at Sammamish, in the County of King, and State of Washington, May 20, 2002.

Respectfully submitted,



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Appendix A
(marked up copy of the claims amended herein)

1. (Twice Amended) A method of recognizing chirographs input into a computer system, comprising:

providing a primary recognizer for converting chirographs to shape indexes, the primary recognizer providing output including a shape index when a chirograph is input thereto;

providing a plurality of secondary recognizers to convert chirographs into code points, and associating the secondary recognizers with at least some of the shape indexes;

receiving a chirograph;

providing the chirograph to the primary recognizer and receiving a shape index therefrom; and

without further decision by the primary recognizer, determining whether one of the secondary recognizers is associated with the shape index, and if so, selecting that secondary recognizer as a selected secondary recognizer[;] and passing the chirograph to the selected secondary recognizer, the secondary recognizer returning a code point [from the secondary recognizer, the code point returned by the secondary recognizer determined independent of the output of the primary recognizer].

7. (Added) A method of recognizing a chirograph input into a computer system, comprising:

receiving a chirograph;

providing the chirograph to a primary recognizer to make a first decision as to a shape index that corresponds to the chirograph; and

without the primary recognizer making a further decision:

selecting a secondary recognizer based on the shape index;

providing the chirograph to the secondary recognizer[, the secondary recognizer determining a recognition result independent of the shape index provided by the primary recognizer]; and

returning the recognition result from the secondary recognizer.

13. (Twice Amended) A system for recognizing chirographs input into a computing device, comprising:

a primary recognizer configured to determine a shape index from a chirograph;

a plurality of secondary recognizers, each secondary recognizer corresponding to [a] at least one shape index;

an interface configured to receive a chirograph and provide it to the primary recognizer, the primary recognizer [causing selection of a selected secondary recognizer based on a determined] providing a shape index corresponding to the chirograph;

a selection mechanism that selects a selected secondary recognizer based on the shape index, without further decision by the primary recognizer; and

the selected secondary recognizer determining a recognition result from the chirograph and returning the recognition result[, wherein the returned recognition result is determined by the secondary recognizer independent of the shape index determined by the primary recognizer].

18. (Amended) A computer-readable medium having computer-executable instructions, comprising:

receiving a chirograph;

providing the chirograph to a primary recognizer and receiving recognition information therefrom; and

without the primary recognizer making a further decision:

determining whether the recognition information corresponds to a recognized result or has a value indicative of a CART tree being associated therewith; and

if the recognition information corresponds to a recognized result, returning the recognized result, and if the recognition information has the value indicative of the CART tree being associated therewith, providing chirograph information to the CART tree and returning a recognition result therefrom[, the recognition result being independent of the value indicative of the CART tree].